

**Exercise 7**

(*difficult*) Solve  $u_{tt} - c^2\Delta u = f(\mathbf{x})$ , where  $f(\mathbf{x}) = A$  for  $|\mathbf{x}| < \rho$ ,  $f(\mathbf{x}) = 0$  for  $|\mathbf{x}| > \rho$ ,  $A$  is a constant, and the initial data are identically zero. Sketch the regions in space-time that illustrate your answer. (*Hint*: Use (13) and find the volume of intersection of two balls, or use (11) and Exercise 9.2.6(b).)